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injurious through their action upon the soil, especially if its unfavorable condition facilitates the formation of  $H_2S$ . Analysis of plants often shows them to contain an increased quantity of the constituents of the dust. Microscopic investigation of the leaves shows clearly the injurious action of various dusts, which is substantiated by tests with the component salts; but there are no typical anatomical marks by which the injury wrought by one kind of dust may be distinguished from another.—C. R. B.

**Polystelic roots.**—Polystely in stems, as described by VAN TIEGHEM, has been disproved, but it seems clear that the phenomenon occurs in roots. CORMACK and later DRABBLE<sup>17</sup> described a multistelic condition in the roots of palms, and a recent research by WHITE<sup>18</sup> proves its occurrence in both the lateral and the tuberous roots of certain orchids belonging to Ophrydinae. In *Habenaria orbiculata* the stele of the lateral root is at its base monostelic, farther out it flattens, becomes horseshoe-shaped, then divides into two steles which at the tip merge into a common plerome cylinder. In *H. blephariglottis* a protostele acquires a pith and internal endodermis, then opens out to a horseshoe-shape from the free ends of which steles are constricted; as in the former case these steles merge into a common plerome at the root tip. In *H. hyerborea* the steles are separate from the start, but increase in number as they proceed farther from their origin. In the tubers the steles have a similar diffuse origin, and it was upon a study of these that VAN TIEGHEM founded his theory of "conrescence" to account for the conditions seen in orchid roots. The present research strongly supports the view advanced by JEFFREY as to the extrastelar nature of the pith, for in *H. blephariglottis* the pith of the proximal part of the central cylinder merges into the fundamental tissue of the polystele. Moreover, the plerome initials are seen to give rise to both fundamental and vascular tissues, hence HANSTEIN's theory as to the correspondence of plerome and periblem to stele and cortex respectively cannot be maintained.—M. A. CHRYSLER.

**Salt marshes of New England.**—The construction of an electric railroad across a salt marsh at York, Maine, recently afforded an opportunity of examining a vertical section through the deposits beneath the turf of the marsh. A study of such a section by PENHALLOW<sup>19</sup> shows that there was an abrupt conversion of a fresh-water bog into a salt marsh by the sudden intrusion of sea water, and that this phenomenon was connected with the gradual subsidence of the general area in which the marsh is situated. It would appear that at some former time (Pliocene) shallow basins existed between islands along the Atlantic coast, and some of these basins, being cut off by the formation of barrier reefs, were converted into

<sup>17</sup> Reviewed in this journal 39:382. 1905.

<sup>18</sup> WHITE, J. H., On polystely in roots of Orchidaceae. Univ. of Toronto Studies, Biological Series no. 6. pp. 20. *pls.* 1, 2. 1907.

<sup>19</sup> PENHALLOW, D. P., A contribution to our knowledge of the origin and development of certain marsh lands on the coast of New England. Trans. Roy. Soc. Canada III. 14:13-56. 1907.

fresh-water ponds by the drainage from the adjacent areas. The ponds subsequently became sphagnum bogs, with the usual succession of vegetation culminating in a white pine swamp. The weight of this forest submerged it in the quaking bog upon which it rested, killing the trees, and establishing more hydrophytic conditions. The white pines then reestablished themselves and dominated the area for a century, when the forest development was abruptly terminated by the influx of salt water caused by the subsidence of the region and the consequent breaking-through of the barrier reef. The duration of the marsh from the establishment of bog plants on the sphagnum to the present time is estimated at 420 years.—GEO. D. FULLER.

**Studies in the rusts.**—OLIVE has published abstracts<sup>20</sup> of two recent studies among the rusts. One deals with the conflicting statements of BLACKMAN and CHRISTMAN in reference to the sexual performance in the caeoma type of rusts. As a result of the study of several species of caeoma rusts, OLIVE confirms CHRISTMAN as to the fusion of two similar gametes by the development of a conjugation pore; but he also finds that the process may begin through a very small pore, so that the nucleus of the migrating protoplast may become stretched out or constricted, thus giving the appearance of BLACKMAN's "nuclear migration." OLIVE also finds that the two gametes differ somewhat in time of development, and presents the observations on which this important conclusion is based.

The other study is concerned with the origin and relationships of the more compact, "cluster-cup" type of structure. It seems that large, irregular, multinucleate cells arise after the sexual fusion, and that the basal cells of the aecidiospore rows arise as the ultimate branches of these cells. Hence the cup structure is derived from a limited and deep-seated group of cells, and the peridium arises in consequence. OLIVE also suggests the method by which the aecidium-cup type may have originated from the simpler caeoma type, and concludes that the former type is the last member of the evolutionary series in this group.—J. M. C.

**Endosperm of caprifigs.**—LECLERC DU SABLON<sup>21</sup> has discovered that in those pistillate flowers of the caprifig in which *Blastophaga* has deposited eggs the endosperm develops, although fertilization has not occurred. Such endosperm he speaks of as parthenogenetic, and observes that it is digested by the larva in the same way that the normal endosperm is digested by the plant embryo, the destruction of the endosperm in both cases being complete. The parthenogenetic endosperm differs strikingly from the ordinary kind, in the absence of cellulose walls, dense cytoplasm, and very large, often irregular nuclei, which are variable in number. In the rare cases in which fertilization has occurred in a pistillate flower of the caprifig, endosperm identical with that of the "*Smyrna fig*" is formed, that

<sup>20</sup> OLIVE, E. W., The relation of "conjugation" and "nuclear migration" in the rusts. *Science N. S.* 27:213. 1908.

———, The relationships of the aecidium-cup type of rust. *Idem* 214.

<sup>21</sup> SABLON, LECLERC DU, Structure et développement de l'albumen du caprifiguier. *Rev. Gén. Botanique* 20:14-24. *pl. 6.* 1908.